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Descriptors-•Achievement Tests, •Curriculum Development, Individualized Curriculum, •Intelligence Tests, Testing, Test Interpretation, •Test Selection

Achievement and intelligence tests have been criticized for their adverse effects on the mental health and intellectual development of children. The fault is not with the testing, but with the instructional program. Reforms in testing must be accomplished as part of a revolution in the total instructional program encompassing: (1) a shift from a fact-laden to an idea-centered curriculum in all subject areas for all students, (2) an emphasis on the "process goals of education", (3) mastery of the subject matter by all students, and (4) individualized instruction tailored to the needs and capabilities of each student. Needed changes in testing include developing instruments able to measure learning outcomes of new curriculum stressing theory and method of inquiry. Different types of subtests measuring the specific learning outcomes of units can be used to individualize instruction. Developments in diagnostic testing are needed to provide the teacher with test approaches and tools for measuring student characteristics as learners in relation to different learning tasks. Finally, a computer based information system is needed to make information accessible on each student. Tests concentrating on specific, objective material and limited to paper and pencil assessment are to be avoided. (CG)

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LEARNING, MENTAL HEALTH, AND TESTING

Glen Heathers

Group intelligence tests and nationally normed achievement tests are on trial. Tests of both types often have measured the wrong things, or have measured poorly what they sought to measure. Many times, test scores have been misused in ways that were harmful to students' educational progress and their mental health. For millions of students, achievement tests have become associated with fear and failure. For millions of students, intelligence tests and the I.Q. have become associated with rejection and feelings of worthlessness.

The "tyranny of testing," as Hoffman (1964) labels it, is a fact in many American schools and colleges. Yet the faults of some tests, and of some uses of tests, do not justify an anti-testing movement in education. Education needs more, not less, testing.

Achievement testing is needed to tell the student, his teachers, his parents, and others what he has learned. Necessarily, many decisions the student makes about himself, and many decisions others make about him, depend on evidence as to what he knows or can do. Testing of one form or another must be relied on for gathering and evaluating such evidence.

Taking stock of learning outcomes is not the most important reason for educational testing. More valuable are the diagnostic uses of testing in connection with planning and conducting the student's educational program. For such purposes, the student and his teachers need specific information on his characteristics as a learner and on his experiences while learning, as well as information about what he already has learned. What are the student's capabilities as a learner? What are his interests? What are his attitudes about himself and about schooling? What have been his difficulties with various learning tasks? What approaches to learning are suitable for him? What help will he require from his teachers and what aspects of learning can he accomplish by himself? How much time will he probably need to master the learning tasks he is to undertake? Testing is needed to provide specific, dependable, and timely answers to such questions as these.

A rational person can oppose certain forms of educational tests and certain testing practices, but he cannot oppose testing as such. Teachers cannot escape testing their students. This is because gathering and evaluating evidence about a student's knowledge or his characteristics as a learner is a testing process. The teacher has a wide choice of informal and formal approaches to testing but not the choice of whether or not to test.

The most fundamental insight into testing comes from recognizing that self-testing is a central aspect of all thoughtful, planful learning. This role of testing as an aspect of learning is repeatedly stressed in the 1966 ASCD Yearbook, Learning and Mental Health in the School (Waetjen and Leeper, 1966). On page 4 of that volume, Waetjen states that "the same curriculum content could enable a youngster not only to discover reality, but to test it. . ." On page 12, Raths refers to research, analysis, and inquiry as "modes of testing ideas about reality." On page 90, Snygg proposes that the curriculum should offer the student many opportunities "to put his ideas to the test of action."

Why is the central role of testing in both learning and teaching often not understood and accepted? A main reason is that many people identify testing with certain published pencil-and-paper tests, especially group tests of intelligence and achievement. Such people, when they oppose using these types of tests, often go farther and say that all forms of tests are unnecessary since teachers' judgments can provide adequate bases for guiding and evaluating students' learning. For example, Martin Mayer writes in The Schools: "Tests and examinations of all sorts are nothing more than an administrative convenience, evidence of the artificiality of the school situation (p. 421)." He recommends depending on teachers' observations and judgments. Teachers' judgments, it should be noted, represent a form of testing, usually based on unsystematic observations of students' behavior. Unfortunately, such judgments, when not supported by the use of specific testing approaches and instruments, are notoriously subject to error. Anyone who doubts this has only to observe how frequently and how drastically teachers disagree in their judgments about students.

Mental health considerations are chief reasons for the unfavorable press given educational testing both within and outside the educational profession. Scores on intelligence tests and on examinations are considered to be unfair because they do not take account of educational disadvantages many students suffer as the result of unfavorable home conditions. The uses of test scores are many times cruel and emotionally crippling. At school, students with low scores on tests tend to be assigned to low groups, required to drill endlessly, made to stay after school, retained in grade a second year, or in other ways treated as third-class members of the school population. At home, students who score badly on tests often are scorned, denied privileges, or physically punished. Reacting to such abuses of today's children, or to the memory of such abuses in their own school backgrounds, many people have called for abandoning tests.

Faults in today's educational tests and their uses are many and would seem to demand a revolution in testing. Such a revolution, though desirable, would not prove sufficient to remedy these faults. Shortcomings in educational testing are mainly symptoms of fundamental faults in the total educational program of which testing is but a part. For example, group testing parallels the prevailing practice of teaching groups rather than individuals in American schools and colleges. The fact that standardized achievement tests measure mainly vocabulary, information, and specific skills reflects the fact that these types of learning outcomes are stressed in our schools. The fact that many students fail tests is not the fault of the tests but of instructional programs that fail to teach students effectively. The fact that I.Q.'s or examination marks are used unwisely and unkindly as bases for decisions about grouping, grading, or promotion is not a fault of tests but of the instructional uses made of test results. The instructional program in general, not testing in particular, must bear the chief onus for abuses in testing.

Reforms in testing, to be fundamental and effective, must be accomplished as part of a revolution in the total instructional program. Such a revolution, I propose, should encompass four types of changes from today's educational programs.

1. Shift from a fact-laden to an idea-centered curriculum in all areas of the school program, with all students, and at all levels of instruction. This theme calls for focusing instruction in each curricular area on key concepts, principles, and theories that contribute toward an understanding of "the structure of knowledge" in the area.

2. Teach all students competencies as learners through stressing the "process goals of education." These process goals are concerned with competencies in acquiring, interpreting, evaluating, and applying knowledge or skills within any area. Process goals involve tool skills (including the three R's); competencies in using methods of inquiry in solving intellectual or practical problems; competencies in independent study (self-teaching); and skills in testing one's ideas or actions using standards of excellence.

3. Organize and conduct instruction with all students and in all areas of the curriculum in such ways that every student gains a working mastery of what he studies, i.e., satisfies standards of excellence. By mastery is meant, not complete and final command of the learning task, but knowledge that is not readily forgotten, that can be applied appropriately, and that can serve as a sound foundation for advancing to the next higher level in the curricular area.

4. Individualize instruction by planning and conducting with each student a program of studies that is tailored to his learning needs and capabilities. Individualization calls for adapting choices of learning tasks, learning materials, instructional methods, and rates of advancement to the characteristics of individual students. Sometimes the student will study independently, sometimes with small groups of his classmates, sometimes in a tutorial relation with his teacher, and sometime in class settings where the teacher lectures or conducts discussions. The essential feature of individualized instruction is that the student's learning program is designed especially for him, not for a mythical average student of his same age or grade level.

The individualization of instruction includes making provision to meet the learning needs of various subgroups in American society. Such groups

include non-English-speaking students, economically underprivileged students, and "the culturally different." The present tendency to lump together children from underprivileged communities into "compensatory education" programs can work against individualizing instruction. Avoiding such an outcome requires giving greater attention to the student's characteristics as an individual than to his origins.

Putting these four themes to work in American schools would require major changes in virtually all components of the educational system. Each theme calls for radical new departures in curriculum, educational materials and media, the education of school leaders and teachers, and organization for instruction. As part of the myriad changes called for, educational testing would need to undergo great changes.

In achievement testing, a first task is to develop procedures and instruments to measure learning outcomes with new curricula that are being developed in the areas of mathematics, science, reading, social studies, and other subjects. Many of these new curricula place stress on teaching theory, and methods of inquiry. Presently, there is a dearth of testing approaches that are suitable for measuring such learnings. New kinds of performance tests are needed, especially to measure competencies in using processes of inquiry and in conducting independent study.

Each new curriculum should be accompanied with tests that have been especially designed for use with that curriculum. These tests would be of different types depending on the types of learning outcomes to be measured. The format of the tests is important. Each unit in the curricular sequence should be provided with a subtest that measures the specific learning outcomes of the unit. Such subtests would have several important values for the teacher. They would offer minute-by-minute help in conducting instruction in relation to the specific objectives of the curricular unit. They would help the teacher obtain the diagnostic information needed for individualizing instruction. And they would foster guiding each student toward mastery of the unit under the study.

Developments in diagnostic testing are especially needed to provide the teacher with test approaches and tools for measuring students' characteristics as learners in relation to different learning tasks. Intelligence tests such as the Binet and the Wechsler measure important components of intellectual functioning. A critical need is for new testing approaches that are suitable for measuring the complex competencies that are involved in conducting inquiry, in planning and performing independent study, or in evaluating one's performance in terms of standards of excellence.

A major problem the teacher faces in planning students' programs of study is that of having ready access to diagnostic information about the student, including information about him that has been obtained by others and at earlier times in his school history. Here the need is for an effective and efficient information storage and retrieval system in the school so that whatever has been learned about the student can be made immediately available to the teacher and in a usable form. For this purpose, it would be desirable to employ a computer-based information system as an adjunct to the school's program of diagnostic and achievement testing.

Almost all of the sorts of changes in testing that have been proposed above are in process of development as part of today's great educational reform movement. Some of these developments are especially noteworthy. The American Association for the Advancement of Science is developing and testing a new type of elementary science curriculum called Science--A Process Approach (1963). The central aim of this curriculum is to teach students competencies in scientific processes of inquiry. As part of the materials prepared for each learning unit in the curricular sequence, the teacher is supplied with assessment materials to use in measuring students' command of the processes taught in the unit. One limitation of the testing approach developed for the AAAS curriculum is the fact that testing is to be done when the study of the unit has been completed. There also, logically, would be pretesting to determine what the student already knows of the unit, and provisions should be made for posttesting individual students as they complete the learning task.

The Educational Testing Service at Princeton, New Jersey recently prepared for the public schools of New York City a set of procedures and materials

whereby teachers can assess first-graders' competencies in certain cognitive processes (Board of Education of the City of New York, 1965). These processes include logical classification, concepts of relationship, and reasoning by inference. The materials are designed to give the teacher specific diagnostic information about pupils' intellectual functioning as a basis for lesson planning. The assessment materials also can be used for instruction in the processes they involve.

At the Oakleaf School in suburban Pittsburgh (Baldwin-Whitehall School District), a research team from the Learning Research and Development Center at the University of Pittsburgh is working with the school's staff in developing a highly-individualized instructional program at the elementary level (Lindvall and Bolvin, 1967). In the program, each pupil studies according to a learning "prescription" that is especially prepared for him. Also, in the areas of reading and mathematics, he always takes a pretest before undertaking a unit of work. His prescription for study explicitly excludes any parts of the learning unit he already has mastered as shown by his pretest results.

The possibilities for building a school's information system around an electronic computer are being explored in a number of projects. It is likely that a system soon will be available that can offer the teacher almost instantly a detailed report giving pertinent background information about any student and providing specific, moment-to-moment records and analyses of his learning progress and problems. Patrick Suppes at Stanford University, in his studies of computer-based instruction in mathematics, has demonstrated that a computer can be programed to give the teacher an immediate printout on each student's learning behavior that both measures his achievement and diagnoses his learning difficulties with the material he just studied.

The four themes proposed for a revolution in instruction have profound implications for both intellectual development and mental health. A focus on learning ideas rather than facts would provide the student with knowledge he could use in interpreting phenomena or in solving problems. A stress on learning how to learn (through achieving the process goals) would provide the student with the intellectual equipment he needs to be a self-educating person and a resourceful problem-solver.

Requiring that every student master whatever he studied would be a way of putting an end to the almost universal practice of fostering or tolerating shoddy learning on the part of better than one-half of all students. It would do away with levels of achievement currently represented by grades of D, E, or F, and would ensure that the great majority of students ordinarily achieved levels of work currently represented by B or A. To enable all students to achieve mastery, it would be necessary to individualize instruction by adapting the learning tasks selected, as well as the materials, methods, and pacing of instruction, to the characteristics of each learner. If the learner were competent in independent study, it would be possible to individualize his program more fully than if he were dependent on the teacher for help at every step in a learning task.

Intellectual competence bears important relations to mental health. An education that stressed gaining command of ideas, learning competencies in conducting inquiry, and mastering what one studies would foster such qualities as objectivity, initiative, self-confidence, pride in achievement, and a sense of adequacy and personal worth. These all are important characteristics of the competent, self-actualizing person.

The mental health significance of testing would be very different if the schools changed to an educational program that stressed theory, the process goals of education, mastery, and individualization. Students would now have a basis for seeing tests as aids to learning and as ways of demonstrating competency. A pretest on a learning unit would give the student and his teacher a clear basis for determining what the student had yet to learn within the unit. If the student had learned how to test his progress as he proceeded with the learning task, he would be able to use self-testing as a way of guiding his study and as a way of knowing when he had achieved the learning goals of the unit. When student and teacher agreed that the learning goals had been met, the student could take a qualifying examination on the unit. Very often, the teacher would decide that the student had demonstrated his command of the unit through his performance while studying it. In such cases, a qualifying test would be superfluous. Students who already had tested their command of learning tasks should have little reason to fear tests. Tests now would become associated, not with fear and failure, but with confidence and success.

It will continue to be true that students of a given age will differ greatly in what they are ready to study and in their rates of learning. How will it be possible to continue using ability and achievement tests and not use test scores in ways that stigmatize students who get low scores? The solution appears to be to individualize the instructional program in such ways that it is possible to eliminate ability grouping, grade placement, and nonpromotion. The emphasis, with each student, would be placed on the progress he was making on tasks selected as suitable for him. For each student, education would remain challenging and demanding. But now education would become a matter of fulfilling learning contracts worked out jointly by students and teachers, contracts that could be met because their requirements were reasonable and appropriate for the student.

If developments in testing are to proceed along the lines that have been proposed, a number of clear and present dangers must be avoided. One danger is placing emphasis in the testing program on those learnings that are most specific and most objective, therefore most readily measured. This tendency to test what is easiest to test is shown in the fact that most of today's standardized achievement tests focus on measuring knowledge of terms, rool skills, and facts. The same tendency is evident in most nongraded programs where skills in reading and arithmetic are the focus of the program because these skills are most readily placed in sequence and most readily measured. We need, instead, much greater stress on testing what Broudy, Smith, and Burnett (1964) have labeled the "applicative" and "interpretive" uses of knowledge rather than on testing mainly "associative" and "replicative" uses.

A second danger is that nearly all testing will be limited to pencil-and-paper tests. Many of the important learnings cannot be measured adequately except through performance tests. Performance tests pose special problems. Often they must be administered individually. Scoring them is difficult because of the amount of judgment required. Nevertheless, such tests must be used increasingly to measure such learning outcomes as the ability to apply theory, competency in conducting inquiries, the ability to organize and defend a point of view, or the ability to analyze and account for one's value choices.

Special problems in the design and use of tests are posed by learning tasks where it is proper that students pursue different routes toward different answers, instead of arriving at an answer that is "right" for all. Certainly this sort of individualization will characterize any sort of creative learning activity. It should characterize all inquiries that students conduct, whether the inquiry is a problem in mathematics, an experiment in science, an analysis of a literary document, or a study of one's personal reasons for action. To test such learnings, we need to measure the processes the student follows in working on the learning task.

A new testing program is not apt to be effective in improving either students' intellectual development or their mental health unless school leaders and teachers learn a great deal more about testing than they know presently. Most schools of education give very little attention to offering prospective school administrators, curriculum coordinators, or teachers a working knowledge of testing approaches and instruments that can be used in diagnosing students' characteristics as learners, analyzing their learning problems, or assessing their learning progress. Many of the abuses of tests in American schools simply result from the fact that school personnel lack training in testing. Today's reform movement in education should give high priority to making instructional personnel sophisticated about the uses and abuses of tests. This is because guiding a student's learning in relation to competency and self-actualization requires that the teacher make effective use of testing in relation to knowing who the student is, where he is going, and when he has gotten there.

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